REMARKS

This application has been reviewed in light of the Office Action dated June 10, 2009. Claims 1-8, 12 and 13 are presented for examination, of which Claims 1, 12 and 13 are in independent form. Claims 12 and 13 have been amended to define still more clearly what Applicants regard as their invention. Favorable reconsideration is respectfully requested.

In the outstanding Office Action, Claims 1-8 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 6,180,870 (Sano et al.) in view of U.S. Patent 5,021,100 (Ishihara et al.) and further in view of Japanese patent document 2000-150934 (Nakajima et al.), and Claims 12 and 13, as being unpatentable over *Ishihara* in view of U.S. Patent 6,468,885 (Mahan et al.).

Applicants submit that the independent claims, together with their dependent claims, are patentably distinct from the cited prior art for at least the following reasons.

As discussed in the specification, a two-layer stacked photovoltaic element consists of a substrate, second unit photovoltaic element (UPE), a second zinc oxide (ZnO) layer, a first ZnO layer, a first UPE, and an electrode stacked in that order (para. [0010]). When shunt passivation is carried out, part of the electrode is removed, helping eliminate short-circuit currents in the first UPE. However, a ZnO layer cannot be similarly removed, which means that short-circuit currents in the second UPE would remain.

According to various aspects of the present invention, the resistivity of the second ZnO layer is made higher than that of the first ZnO layer to help curb the spread of short-circuit currents in the second UPE into the second ZnO layer (para. [0050] and [0051]).

Claim 1

Claim 1 recites, among other features, that "a resistivity of the zinc oxide layer on the surface in contact with a unit photovoltaic element near a substrate as seen from the zinc oxide layer is higher than a resistivity of the zinc oxide layer on the surface in contact with a unit photovoltaic element further away from the substrate as seen from the zinc oxide layer."

The feature quoted above is not believed to be disclosed or suggested in *Sano*, *Ishihara*, and *Nakajima*, considered separately or in any permissible combination. The Office Action states that it would have been obvious to one of ordinary skill in the art at the time of the present invention to modify the combination of the *Sano* system and the *Ishihara* system with the teaching of *Nakajima* to improve the junction between the ZnO layer and the photoelectric conversion elements without compromising the light-transmissive properties of the ZnO layer. Applicants believe that this statement is based on overbroad reasoning without offering a proper motivation for combining *Sano* in view of *Ishihara* with *Nakajima*.

As Applicants understand, *Nakajima* relates to a photoelectric conversion device that consists of a reflective metal layer, an ZnO layer, and a photoelectric conversion element arranged in that order (*see* para. [0033]). The side of the ZnO layer next to the photoelectric conversion element has a higher impurity concentration and thus lower resistance, and the other side of the ZnO layer next to the reflective metal layer has a lower impurity concentration. In this way, it is expected to be easier for light from the reflective metal layer to go through the ZnO layer and eventually reach the photoelectric conversion element, as well as for electricity from the photoelectric conversion element to reach the ZnO layer and be collected there (*see* Abstract).

Even assuming that the combination of *Sano* and *Ishihara* were permissible and offered 1) a configuration of a substrate, a second UPE, a second zinc oxide (ZnO) layer, a

second ZnO layer, a first ZnO layer, a first UPE, and an electrode stacked in that order, 2) a configuration of a reflective metal layer, a ZnO layer, and a photoelectric conversion element arranged in that order as in *Nakajima*, which is distinct from 1), would still be missing. Accordingly, Applicants do not see any motivation for combining *Sano* in view of *Ishihara* with *Nakajima*.

Specifically, Nakajima clearly *differentiates the two sides of a ZnO layer* as one to allow light to easily come through and the other side to allow electricity to easily come through, with respect to 2). Applicants do not see how the two ZnO layers in 1) can possibly be distinguished in the same way, with UPEs flanking the ZnO layers. The Office Action's argument is not believed to lead to such a differentiation; on the contrary, the Office Action appears to rather arbitrarily designate, in an attempt to derive aspects of the present invention from the combination of *Sano*, *Ishihara*, and *Nakajima*, the ZnO layer closer to the substrate to be the side where light should easily come through and the ZnO layer further from the substrate to be the side where electricity should easily come through.

Accordingly, for at least the reasons noted above, Claim 1 is believed to be allowable over *Sano*, *Ishihara*, and *Nakajima*, considered separately or in any permissible combination.

Claims 12 and 13

Claim 12 recites, among other features, that "two layers are stacked to form the intermediate layer [between two UPEs] and the second layer [composed of ZnO] is formed at a rate higher than that of the first layer [composed of In_2O_3]." Similarly, Claim 13 recites, among

other features, that "two layers are stacked to form the intermediate layer and the second layer is formed at a temperature lower than that of the first layer."

The features quoted above are not believed to be disclosed or suggested in *Ishihara* and *Mahan*, considered separately or in any permissible combination. While conceding that these features are not disclosed in *Ishihara*, the Office Action appears to state that they are obvious from *Mahan*. Applicants respectfully disagree.

As Applicants understand, *Mahan* relates to a method for fabricating an a-Si:H layer to be used as semiconductor material. The portion of *Mahan* cited in the Office Action as disclosing the features quoted above describes merely how the substrate temperature is related to the deposition rate, which two factors together control the hydrogen content in the deposition of the silicohydride gas. It does not at all discuss how the deposition rate and deposition temperate independently affect the formation of *two distinct sub-layers of an intermediate layer between two UPEs* in respectively different ways, such as a higher deposition rate used in the formation of the second layer than the first layer or a lower deposition temperature used in the formation of the second layer than the first layer.

Therefore, even assuming that the same technique used in the deposition of silicohydride gas could conceivably and readily be applied to the formation of an intermediate layer composed of ZnO and In_2O_3, where silicohydride gas and ZnO and In_2O_3 have completely different properties, such an application does not lead to the specific use of a higher deposition rate or lower temperature in the formation of one sub-layer of the intermediate layer than the other sub-layer.

Accordingly, for at least the reasons noted above, Claims 12 and 13 are believed to be allowable over *Ishihara* and *Mahan*, considered separately or in any permissible combination.

A review of the other art of record has failed to reveal anything which, in Applicants' opinion, would remedy the deficiencies of the art discussed above, as references against the independent claims herein. Those claims are therefore believed patentable over the art of record.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

In view of the foregoing remarks, Applicants respectfully request favorable reconsideration and early passage to issue of the present application.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,

/Leonard P Diana/
Leonard P. Diana
Attorney for Applicants
Registration No.: 29,296

FITZPATRICK, CELLA, HARPER & SCINTO
30 Rockefeller Plaza
New York, New York 10112-3801
Facsimile: (212) 218-2200

FCHS_WS 3864502_1.DOC